

## IN THE CLAIMS:

1           1. (Currently Amended) A rotary tool for drilling into a  
2 soil formation from its surface, controllably injecting water and  
3 dry binder at known depths below the surface of said formation,  
4 and mixing said soil, water and dry binder to form an in-situ  
5 piling, said tool comprising:

6                 a rotary shaft having a central axis of rotation  
7 adapted to be driven bi-directionally around said axis, and bi-  
8 directionally along said axis;

9                 a vane on and extending radially from said shaft to be  
10 rotated around and moved axially by said shaft, said vane being  
11 so disposed and arranged as to move through the formation along a  
12 helical path to drill into said formation, to stir the material  
13 of the formation, and ultimately to mix the material of the  
14 formation with water and dry binder;

15                a water injector and a binder injector carried by said  
16 tool, each injector having a respective axis of emission of water  
17 or of dry binder, said axes of emission being directed away from  
18 said tool into said formation at a respective location along said  
19 central axis;

20                said injectors being so disposed and arranged relative  
21 to one another that the material of their emissions will during a  
22 limited number of revolutions of said shaft, encounter one  
23 another, there to be mixed as a pre-determined ratio of water and

24 of dry binder, said water including water emitted from the water  
25 injector and water which may have already been present at that  
26 location;

27 said injectors being set in said shaft with their axes of  
28 emission substantially normal to said central axis, and located  
29 along said central axis such that the emission of one of them  
30 will, within a limited number or rotations of the shaft encounter  
31 and mix with the other in a temporally suitable time related to  
32 the curing of the binder and drainage of the water;

33 there being a pair of said water injectors and at least one  
34 of said binder injectors set in said shaft, with said binder  
35 injector located axially between said water injectors.

1 Claim 2 (cancelled)

2 Claim 3 (cancelled)

3 Claim 4 (cancelled)

4 Claim 5 (cancelled)

5 Claim 6 (cancelled)

6 Claim 7 (cancelled)

7 Claim 8 (cancelled)

8 Claim 9 (cancelled)

1           10. (Previously Presented) In combination:

2           a rotary tool for drilling into a soil formation from its  
3 surface, controllably injecting water and dry binder at known  
4 depths below the surface of said formation, and mixing said soil,  
5 water and dry binder to form an in-situ piling, said tool  
6 comprising:

7           a rotary shaft having a central axis of rotation  
8 adapted to be driven bi-directionally around said axis, and bi-  
9 directionally along said axis;

10           a vane on and extending radially from said shaft to be  
11 rotated around and moved axially by said shaft, said vane being  
12 so disposed and arranged as to move through the formation along a  
13 helical path to drill into said formation, to stir the material  
14 of the formation, and ultimately to mix the material of the  
15 formation with water and dry binder;

16           a water injector and a binder injector carried by said  
17 tool, each injector having a respective axis of emission of water  
18 or of dry binder, said axes of emission being directed away from  
19 said tool into said formation at a respective location along said  
20 central axis;

21           said injectors being so disposed and arranged relative  
22 to one another that the material of their emissions will during a  
23 limited number of revolutions of said shaft, encounter one  
24 another, there to be mixed as a pre-determined ratio of water and

25 of dry binder, said water including water emitted from the water  
26 injector and water which may have already been present at that  
27 location;

28 a control valve respective to each of said injectors,  
29 whereby the rate of supply of water and of dry binder can  
30 independently be regulated by said control valves to provide  
31 binder at a rate desired at a respective depth and water at a  
32 rate desired which with existing water already in the formation  
33 at that depth, will constitute at least sufficient water for  
34 stoichiometric reaction of the binder;

35 said injectors being set in said shaft with their axes of  
36 emission substantially normal to said central axis, and located  
37 along said central axis such that the emission of one of them  
38 will, within a limited number of rotations of the rotary tool  
39 encounter and mix with the other in a temporally suitable time  
40 related to the curing of the binder and drainage of the water.

1 Claim 11 (cancelled)

2 Claim 12 (cancelled)

3 Claim 13 (cancelled)

4 Claim 14 (cancelled)

5 Claim 15 (cancelled)

6 Claim 16 (cancelled)

7 Claim 17 (cancelled)

8 Claim 18 (cancelled)

9 Claim 19 (cancelled)

1 20. (Currently Amended) The method of forming an in-situ  
2 piling in a soil formation with a dry binder and sufficient water  
3 to produce a stoichiometrically correct mixture, comprising:

4 with a rotary tool, drilling into said formation, said  
5 tool having a rotary shaft that has a central axis of rotation  
6 and a vane for drilling into and mixing the soil, rotated around  
7 and moved axially by said shaft, said vane being so disposed and  
8 arranged as to move through the formation along a helical path to  
9 drill into said formation, to stir the material of the formation,  
10 and ultimately to mix the material of the formation with water  
11 and binder;

12 a water injector and a dry binder injector carried by  
13 said tool;

14 driving said tool axially into and out of said  
15 formation while rotating it;

16 at some times during axial movement of said tool,  
17 simultaneously discharging said water from said water injector  
18 into said soil formation along an axis of emission of said water  
19 and discharging said dry binder from said binder injection  
20 injector into said soil formation along an axis of emission of  
21 said dry binder under continuous control of the rate of supply of

22 each, both said axes of emission being radially directed away  
23 from said shaft tool into said soil formation at a respective  
24 location along said central axis of said shaft, so that said  
25 water and said dry binder being emitted from said water injector  
26 and from said binder injector, respectively, will during a  
27 limited number of revolutions of said shaft encounter one another  
28 to become a mixture at various- respective depths with-a as a  
29 pre-determined ratio of water and dry binder, said ratio being  
30 responsive to requirements at the respective depth, said  
31 required water including water emitted from said water injector  
32 and water which may have already been present at that depth in  
33 said soil formation, said resulting mixture of water and binder  
34 further including material of the soil formation. being  
35 temporarily-made-

1 21. (Original) The method of claim 20 in which injection of  
2 binder is made during passage of said tool into said soil  
3 formation.

1 22. (Original) The method of claim 20 in which injection of  
2 binder is made during passage of said tool out of said soil  
3 formation.

1        23. (Original) The method of claim 20 in which injection of  
2 water is made during passage of said tool into said soil  
3 formation.

1        24. (Original) The method of claim 20 in which injection of  
2 water is made during passage of said tool out of said soil  
3 formation.

1        Claim 25 (cancelled)

1        26.(Original) The method of claim 20 in which the emission  
2 of one of said injectors is encountered in said soil formation in  
3 a temporally suitable time related to the curing of the binder  
4 and drainage of the water.

1        27. (Previously Presented) The method of claim 20 in which  
2 the emission of water is determined by a program responsive to  
3 data from a representative core.

1        28.(Original) The method of claim 20 in which the emission of  
2 water is determined by a program responsive to data relating to  
3 water content already in the soil derived from a sensor on said  
4 tool disposed at an axial location below the place of injection  
5 of said binder.

1        29. (Original) The method of claim 20 in which the pressure  
2 of the stream of water and of the binder in the tool is above the  
3 ambient pressure which exists in the formation.

      Please add the following new claims:

1        30. (New) The method of claim 20 in which emission of water  
2 and binder are under continuous control.

1        31. (New) A method according to claim 20 in which the  
2 emission of water and binder are under continuous adjustable  
3 control.